

```
BBBBBBBBBBBBBB      AAAAAAAAAA      SSSSSSSSSSSSSS      RRRRRRRRRRRR      TTTTTTTTTTTTTTTT      LLL
BBBBBBBBBBBBBB      AAAAAAAAAA      SSSSSSSSSSSSSS      RRRRRRRRRRRR      TTTTTTTTTTTTTTTT      LLL
BBBBBBBBBBBBBB      AAAAAAAAAA      SSSSSSSSSSSSSS      RRRRRRRRRRRR      TTTTTTTTTTTTTTTT      LLL
BBB      BBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBBBBBBBBBBBBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBBBBBBBBBBBBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBBBBBBBBBBBBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAAAAAAAAAAAAAAAAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAAAAAAAAAAAAAAAAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAAAAAAAAAAAAAAAAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBB      BBB      AAA      AAA      SSS      SSS      RRR      RRR      TTT      TTT      LLL
BBBBBBBBBBBBBB      AAA      AAA      SSSSSSSSSSSSSS      RRR      RRR      TTT      TTT      LLLLLLLLLLLLLLLL
BBBBBBBBBBBBBB      AAA      AAA      SSSSSSSSSSSSSS      RRR      RRR      TTT      TTT      LLLLLLLLLLLLLLLL
BBBBBBBBBBBBBB      AAA      AAA      SSSSSSSSSSSSSS      RRR      RRR      TTT      TTT      LLLLLLLLLLLLLLLL
```

```
BBBBBBBBB      AAAAAA      SSSSSSSS      IIIIII      NN      NN      IIIIII      GGGGGGGG      SSSSSSSS      BBBBBBBBB      ....
BBBBBBBBB      AAAAAA      SSSSSSSS      IIIIII      NN      NN      IIIIII      GGGGGGGG      SSSSSSSS      BBBBBBBBB      ....
BB      BB      AA      AA      SS      SS      NN      NN      II      II      GG      SS      BB      BB      ....
BB      BB      AA      AA      SS      SS      NN      NN      II      II      GG      SS      BB      BB      ....
BB      BB      AA      AA      SS      SS      NNNN      NN      II      II      GG      SS      BB      BB      ....
BBBBBBBBB      AA      AA      SSSSSS      II      II      NN      NN      II      II      GG      SSSSSS      BBBBBBBBB      ....
BBBBBBBBB      AA      AA      SSSSSS      II      II      NN      NN      II      II      GG      SSSSSS      BBBBBBBBB      ....
BB      BB      AAAAAAAAAA      SS      II      NN      NN      II      II      GG      SSSSSS      BB      BB      ....
BB      BB      AAAAAAAAAA      SS      II      NN      NN      II      II      GG      SSSSSS      BB      BB      ....
BB      BB      AA      AA      SS      II      NN      NN      II      II      GG      SSSSSS      BB      BB      ....
BB      BB      AA      AA      SS      II      NN      NN      II      II      GG      SSSSSS      BB      BB      ....
BBBBBBBBB      AA      AA      SSSSSSSS      IIIIII      NN      NN      IIIIII      GGGGGG      SSSSSSSS      BBBBBBBBB      ....
BBBBBBBBB      AA      AA      SSSSSSSS      IIIIII      NN      NN      IIIIII      GGGGGG      SSSSSSSS      BBBBBBBBB      ....

LL      IIIIII      SSSSSSSS
LL      IIIIII      SSSSSSSS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SSSSSS
LL      II      SSSSSS
LL      II      SS
LL      II      SS
LL      II      SS
LL      II      SS
LLLLLLLLLLL      IIIIII      SSSSSSSS
LLLLLLLLLLL      IIIIII      SSSSSSSS
```

```
1 0001 0 MODULE BASSINIT_GOSUB (
2 0002 0 IDENT = '1-003'
3 0003 0 ) =
4 0004 1 BEGIN
5 0005 1
6 0006 1 *****
7 0007 1 *
8 0008 1 * COPYRIGHT (c) 1978, 1980, 1982, 1984 BY
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25 0025 1 *
26 0026 1 *****
27 0027 1
28 0028 1
29 0029 1
30 0030 1
31 0031 1 **
32 0032 1 FACILITY: BASIC-PLUS-2 Frame Support
33 0033 1
34 0034 1 ABSTRACT:
35 0035 1
36 0036 1 These routines set up and tear down frames for BASIC-PLUS-2.
37 0037 1 Frames are used for main routines, external functions,
38 0038 1 external subroutines, internal functions (both DEFs and DEF*s)
39 0039 1 internal subroutines (GOSUBs) and condition handlers.
40 0040 1
41 0041 1 ENVIRONMENT: VAX-11 user mode
42 0042 1
43 0043 1 AUTHOR: John Sauter, CREATION DATE: 10-Oct-78
44 0044 1
45 0045 1 MODIFIED BY:
46 0046 1
47 0047 1 1-001 - Original.
48 0048 1 1-002 - Change BASS prefix to BASS for stack frame names. JBS 08-FEB-1979
49 0049 1 1-003 - Set the IV bit in the PSW if called for. JBS 11-SEP-1979
50 0050 1 --
51 0051 1
52 0052 1
53 0053 1 !<BLF/PAGE>
```



```

55      0054 1  !
56      0055 1  ! SWITCHES:
57      0056 1  !
58      0057 1  !
59      0058 1  SWITCHES ADDRESSING_MODE (EXTERNAL = GENERAL, NONEXTERNAL = WORD_RELATIVE);
60      0059 1  !
61      0060 1  !
62      0061 1  ! LINKAGES:
63      0062 1  !
64      0063 1  !
65      0064 1  LINKAGE
66      0065 1  BASS$GOSUB_LINK = CALL (STANDARD) :
67      0066 1  GLOBAL (BSF$A_MAJOR_STG = 11, BSF$A_MINOR_STG = 10, BSF$A_TEMP_STG = 9),
68      0067 1  !
69      0068 1  BASS$GOSUB_JSB = JSB :
70      0069 1  GLOBAL (BSF$A_MAJOR_STG = 11, BSF$A_MINOR_STG = 10, BSF$A_TEMP_STG = 9) !
71      0070 1  NOTUSED (8, 7, 6, 5, 4, 3, 2)
72      0071 1  NOPRESERVE (1, 0);
73      0072 1  !
74      0073 1  !
75      0074 1  ! TABLE OF CONTENTS:
76      0075 1  !
77      0076 1  !
78      0077 1  FORWARD ROUTINE
79      0078 1  BASS$INIT_GOSUB : BASS$GOSUB_LINK NOVALUE; ! start GOSUB
80      0079 1  !
81      0080 1  !
82      0081 1  ! INCLUDE FILES:
83      0082 1  !
84      0083 1  !
85      0084 1  REQUIRE 'RTLIN:RTLPSECT'; ! macros for defing psects
86      0179 1  !
87      0180 1  REQUIRE 'RTLIN:BASFRAME'; ! Define frame structure
88      0383 1  !
89      0384 1  LIBRARY 'RTLSTARLE'; ! System symbols
90      0385 1  !
91      0386 1  !
92      0387 1  ! MACROS:
93      0388 1  !
94      0389 1  ! NONE
95      0390 1  !
96      0391 1  ! EQUATED SYMBOLS:
97      0392 1  !
98      0393 1  ! NONE
99      0394 1  !
100     0395 1  ! PSECTS:
101     0396 1  !
102     0397 1  DECLARE_PSECTS (BAS); ! declare psects for BASS$ facility
103     0398 1  !
104     0399 1  ! OWN STORAGE:
105     0400 1  !
106     0401 1  ! NONE
107     0402 1  !
108     0403 1  ! EXTERNAL REFERENCES:
109     0404 1  !
110     0405 1  !
111     0406 1  EXTERNAL ROUTINE
```

BASSINIT_GOSUB
1-003

K 3
16-Sep-1984 00:36:39
14-Sep-1984 11:55:07

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[BASRTL.SRC]BASINIGSB.B32;1

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(2)

: 112 0407 1 BASS\$SIGNAL : NOVALUE,
: 113 0408 1 BASS\$HANDLER;
: 114 0409 1

! signals error
! handles signals

```

116 0410 1 GLOBAL ROUTINE BASSINIT_GOSUB (
117 0411 1     NEW_PC
118 0412 1     ) : BASSGOSUB_LINK NOVALUE =
119 0413 1
120 0414 1 ++
121 0415 1 FUNCTIONAL DESCRIPTION:
122 0416 1
123 0417 1     Set up a frame for a BASIC-PLUS-2 GOSUB. The frame is allocated
124 0418 1     on the stack. R11, R10 and R9 are not touched.
125 0419 1
126 0420 1 FORMAL PARAMETERS:
127 0421 1
128 0422 1     NEW_PC.ra.v    PC of the GOSUB target line.
129 0423 1
130 0424 1 IMPLICIT INPUTS:
131 0425 1
132 0426 1     NONE
133 0427 1
134 0428 1 IMPLICIT OUTPUTS:
135 0429 1
136 0430 1     NONE
137 0431 1
138 0432 1 ROUTINE VALUE:
139 0433 1
140 0434 1     NONE
141 0435 1
142 0436 1 COMPLETION CODES:
143 0437 1
144 0438 1     NONE
145 0439 1
146 0440 1 SIDE EFFECTS:
147 0441 1
148 0442 1     Leaves lots of things on the stack for use by the compiled
149 0443 1     BASIC-PLUS-2 code. These things will be removed by
150 0444 1     BASSEND_GSB_R8.
151 0445 1
152 0446 1 --
153 0447 1
154 0448 2 BEGIN
155 0449 2 ++
156 0450 2 The following external registers are nearly passed through to
157 0451 2 the compiled code.
158 0452 2 --
159 0453 2
160 0454 2 EXTERNAL REGISTER
161 0455 2     BSFSA_MAJOR_STG,
162 0456 2     BSFSA_MINOR_STG,
163 0457 2     BSFSA_TEMP_STG;
164 0458 2
165 0459 2 BUILTIN
166 0460 2     FP,
167 0461 2     SP,
168 0462 2     BISPSW;
169 0463 2
170 0464 2 ++
171 0465 2 Define local variables as registers. We cannot have any stack
172 0466 2 locals since we manipulate the stack pointer in this routine.

```



```

173 0467 2 :-
174 0468
175 0469 REGISTER
176 0470 FMP : REF BLOCK [0, BYTE] FIELD (BSF$FCD); ! pointer to FCD
177 0471 PREV_FMP : REF BLOCK [0, BYTE] FIELD (BSF$FCD); ! points to previous frame
178 0472
179 0473 +
180 0474 Allocate frame control data.
181 0475
182 0476 FMP = .FP;
183 0477 SP = .FMP - BSF$K_LENFCDSB;
184 0478 +
185 0479 Initialize the parts of the fcd relevant to a gosub.
186 0480
187 0481 FMP [BSF$A_MARK] = 0;
188 0482 FMP [BSF$A_BASE_SP] = .SP;
189 0483 FMP [BSF$A_BASE_R11] = .BSF$A_MAJOR_STG;
190 0484 FMP [BSF$A_BASE_R10] = .BSF$A_MINOR_STG;
191 0485 FMP [BSF$A_BASE_R9] = .BSF$A_TEMP_STG;
192 0486
193 0487 The "PROCEDURE ID" is the address of the start of the GOSUB.
194 0488
195 0489 FMP [BSF$A_PROC_ID] = .NEW_PC;
196 0490 +
197 0491 Copy the frame flags from the previous frame. The previous
198 0492 frame had better be a basic frame.
199 0493
200 0494 PREV_FMP = .FMP [BSF$A_SAVED_FP];
201 0495 FMP [BSF$W_FCD_FLAGS] = .PREV_FMP [BSF$W_FCD_FLAGS];
202 0496 +
203 0497 Mark this as a "GOSUB" frame. Such frames are removed very easily
204 0498 when, for example, returning from a condition handler. This is
205 0499 because GOSUB has no lexical scope, and so we cannot enforce
206 0500 well-structured programming practices which involve it.
207 0501
208 0502 FMP [BSF$B_PROC_CODE] = BSF$K_PROC_GOSB;
209 0503 +
210 0504 Set the frame length field.
211 0505
212 0506 FMP [BSF$B_LEN_FCD] = BSF$K_LENFCDSB;
213 0507 +
214 0508 Set the integer overflow interrupt enable bit in the PSW if the parent
215 0509 frame has it set.
216 0510
217 0511
218 0512 IF ((.FMP [BSF$W_FCD_FLAGS] AND BSF$M_FCD_IV) NEQ 0) THEN BISPSW (%REF (PSW$M_IV));
219 0513
220 0514 +
221 0515 Set up the handler address to mark this as a BASIC frame and for
222 0516 VAX/VMS CHF.
223 0517
224 0518
225 0519 FMP [BSF$A_HANDLER] = BASS$HANDLER;
226 0520 +
227 0521 Branch to the compiled code. This code will call BASS$END_GSB_R8
228 0522 rather than returning.
229 0523

```

BASS\$INIT_GOSUB
1-003

N 3
16-Sep-1984 00:36:39
14-Sep-1984 11:55:07

VAX-11 Bliss-32 V4.0-742
[BASRTL.SRC]BASINIGSB.B32;1

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(3)

: 230 0524 2 BASS\$GOSUB_JSB (.NEW_PC);
: 231 0525 1 END;

! of BASS\$INIT_GOSUB

0000 00000
50 5D D0 00002
5E A0 9E 00005
FC A0 D4 00009
F8 A0 5E D0 0000C
F0 A0 5A 7D 00010
EC A0 59 D0 00014
E8 A0 04 AC D0 00018
51 0C A0 D0 0001D
E6 A0 E6 A1 B0 00021
E4 A0 0620 8F B0 00026
E6 A0 0B E1 0002C
60 00000000G 20 B8 00031
04 BC 00 9E 00033 1\$:
16 0003A
04 0003D

.TITLE BASS\$INIT_GOSUB
.IDENT \1-003\
.EXTRN BASS\$\$SIGNAL, BASS\$HANDLER
.PSECT _BASS\$CODE, NOWRT, SHR, PIC, 2
.ENTRY BASS\$INIT_GOSUB, Save nothing
MOVL FP, FMP
MOVAB -32(R0), SP
CLRL -4(FMP)
MOVL SP, -8(FMP)
MOVQ BSF\$A_MINOR_STG, -16(FMP)
MOVL BSF\$A_TEMP_STG, -20(FMP)
MOVL NEW_PC, -24(FMP)
MOVL 12(FMP), PREV_FMP
MOVW -26(PREV_FMP), -26(FMP)
MOVW #1568, -28(FMP)
BBC #11, -26(FMP), 1\$
BISPSW #32
MOVAB BASS\$HANDLER, (FMP)
JSB @NEW_PC
RET

: 0410
: 0476
: 0477
: 0481
: 0482
: 0484
: 0485
: 0489
: 0494
: 0495
: 0506
: 0512
: 0519
: 0524
: 0525

: Routine Size: 62 bytes, Routine Base: _BASS\$CODE + 0000

: 232 0526 1
: 233 0527 1 END
: 234 0528 1
: 235 0529 0 ELUDOM

PSECT SUMMARY

Name	Bytes	Attributes
_BASS\$CODE	62	NOVEC, NOWRT, RD, EXE, SHR, LCL, REL, CON, PIC, ALIGN(2)

Library Statistics

File	----- Total	Symbols Loaded	----- Percent	Pages Mapped	Processing Time
_\$255\$DUA28:[SYSLIB]STARLET.L32;1	9776	1	0	581	00:01.1

BASSINIT_GOSUB
1-003

B 4
16-Sep-1984 00:36:39
14-Sep-1984 11:55:07

VAX-11 Bliss-32 V4.0-742
[BASRTL.SRC]BASINIGSB.B32;1

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(3)

COMMAND QUALIFIERS

: BLISS/CHECK=(FIELD,INITIAL,OPTIMIZE)/NOTRACE/LIS=LISS:BASINIGSB/OBJ=OBJ\$:BASINIGSB MSRC\$:BASINIGSB/UPDATE=(ENH\$:BASINIGSB
:)

: Size: 62 code + 0 data bytes
: Run Time: 00:05.5
: Elapsed Time: 00:12.0
: Lines/CPU Min: 5813
: Lexemes/CPU-Min: 19758
: Memory Used: 59 pages
: Compilation Complete

0024 AH-BT13A-SE
VAX/VMS V4.0

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BASLEFT
LIS

BASMARGIN
LIS

BASINTOL
LIS

BASKILL
LIS

BASTOBEG
LIS

BASTOEND
LIS

BASMATADD
LIS

BASMATAP
LIS